

MASTER SYLLABUS

MATH 222 - Calculus II

- A. **COURSE LECTURE-LAB-CREDIT and/ CONTACT HOURS:** 3-2-4
- B. **COURSE MAXIMUM ENROLLMENT:** 35
- C. **SPECIAL FACILITY or EQUIPMENT NEEDS/SAFETY RULES & ISSUES:** None
- D. **LAB FEE:** \$ 5.00

1. **COURSE NAME:** Calculus II

2. **COURSE PREFIX AND NUMBER:** MATH 222

3. **COURSE DESCRIPTION:** This course includes the study of integral applications - calculations of areas, volumes, work, and force; logarithmic and exponential functions; inverse trigonometric and hyperbolic functions; advanced integration techniques; L'Hopital's Rule and improper integrals.

4. **PRE- & CO-REQUISITES:** MATH 221 - Calculus I

5. **COURSE GOAL:** The goal of this course is (1) to equip the student with the mathematical skills and knowledge sufficient to move to the next level of Calculus and (2) to apply calculus techniques to problem-solving in a chosen field of study, most frequently computer science, engineering, or mathematics.

6. **COURSE OBJECTIVES:** The student will be able to:

1. Calculate the area between two curves.
2. Calculate volumes via slicing.
3. Calculate volumes via cylindrical shells.
4. Determine arc lengths of functions.
5. Compute the area of a surface of revolution.
6. Solve work, force and fluid pressure problems.
7. Analyze and use the properties of logarithmic functions with special emphasis on the natural logarithmic function.
8. Differentiate and integrate the natural logarithmic function.
9. Analyze, differentiate, and integrate exponential functions.
10. Find the limits of and graph logarithmic and exponential functions.

11. Analyze, differentiate, and integrate hyperbolic functions.

OPTIONAL

12. Solve basic First Order Differential equations and applications.

13. Analyze, evaluate, differentiate, and integrate inverse trigonometric functions.

14. Analyze, evaluate, differentiate, and integrate inverse hyperbolic functions.

15. Integrate using Substitutions and/or the table of integrals.

16. Integrate by parts.

17. Integrate powers of trigonometric functions.

18. Apply trigonometric substitution to integration.

19. Integrate rational functions using partial fractions where applicable.

20. Integrate numerically using midpoint, trapezoid, and Simpson's Rules.

21. Determine whether or not improper integrals converge and evaluate those that do converge.

22. Evaluate limits of indeterminate forms via L'Hopitals rule (type 0/0 or ∞/∞) of other previously discussed methods.

7. COURSE CONTENT:

I. Review of Calculus I

II. Applications of the Definite Integral

A. Area between two curves

B. Volumes by slicing

C. Volumes by cylindrical shells

D. Length of a plane curve

E. Area of surface of revolution

F. Rectilinear motion

G. Work

H.Fluid pressure and force

II.Logarithmic and Exponential Functions

A.Inverse functions

B.Logarithms and irrational exponents

C.The natural logarithms

D.Exponential functions

E.Graphs of equations involving exponentials and logarithms

F.Hyperbolic functions

OPTIONAL

G.First order differential equations and applications

III.Inverse Trigonometric and Hyperbolic Functions

A.Inverse trigonometric functions

B.Derivatives and integrals involving inverse trigonometric functions

C.Inverse hyperbolic functions

IV.Techniques of Integration

A.Integration using tables

B.Integration by parts

C.Integrating powers of sine and cosine

D.Integrating powers of secant and tangent

E.Trigonometric substitutions

F.Integrating rational functions; partial fractions

G.Numerical integration

V.Improper Integrals; L'Hopital's Rule

A.Improper integrals

B.L'Hopital's Rule (0/0 type)

C.Other indeterminate forms

8. **TEXT:** Calculus, 4th edition by Howard Anton

Suggested Supplements: Student solutions manual to accompany
Anton calculus 4th Edition by Albert Horn
The Calculus Companion to Accompany Anton Calculus volume 1 and 2 by
William H. Barker and James E. Ward

9. **ASSESSMENT:** This will vary at the discretion of the instructor but may include homework, 3 or 4 tests, and the required final examination. By departmental policy, the final examination must account for at least $1/4$ of the final grade while homework and tests comprise no more than $3/4$ of the final grade.